TECHNICAL REVIEW DOCUMENT for OPERATING PERMIT 950PWE100

to be issued to:

Duke Energy Field Services, Inc Lucerne Gas Processing Plant Weld County Source ID 1230107

Prepared by Michael E. Jensen October 8, 1998

I. PURPOSE:

This document establishes the basis for decisions made regarding the Applicable Requirements, Emission Factors, Monitoring Plan and Compliance Status of Emission Units covered within the Operating Permit proposed for this site. It is designed for reference during review of the proposed permit by the EPA and during Public Comment. Conclusions in this document are based on information provided in the original application submittal of December 8, 1995, the supplemental technical submittals received November 12, 1996, March 3, May 23, a June 18, 1997 site visit, and the supplemental technical information needed for the preparation of the construction permit, as well as numerous telephone contacts with the applicant.

II. Source Description:

This plant is classified as a natural gas processing plant and compressor station as set forth under Standard Industrial Classification 1321. The plant is designed to extract natural gas liquids from field-produced natural gas, and recompress the processed gas prior to transmission to the sales pipeline. The process involves the use of three (3) split service compressors. One side of the compressor is used to compress the natural gas and the other side is used to compress the process skid refrigerant. The split service compressors are all driven by 1100 HP Waukesha internal combustion (IC) engines.

Field gas is first charged to a separator where liquids formed during transport to the plant are separated from the gas stream. The liquids are stored in three (3) 300 barrel capacity storage tanks until trucked off-site. After the separator, one of the split service compressors and a compressor driven by a Waukesha 450 HP IC engine compress the gas stream from 50-70 PSI to 550 PSI for processing.

The 550 PSI gas stream is cooled to -35 to -40°F by the process skid refrigeration system. The chilled gas is mixed with glycol to absorb the moisture and dry the gas. The moisture laden glycol is piped to the reheater where the moisture is released by raising the temperature of the solution. The moisture release is discharged to the atmosphere. The regenerated glycol solution is recirculated to

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the process skid. The propane used for the refrigeration process is stored in a 5,000 gallon pressure tank (bullet tank).

The natural gas liquids (Y-grade liquids) produced by the process skid are stored in three (3) 30,000 gallon pressure tanks. The compressed liquids are transported off-site by truck. The dried gas stream is recompressed to pipeline pressures by one of the split service compressors and a compressor driven by a 1100 horsepower IC engine. The Btu content of the pipeline gas is adjusted by adding compressed air to the gas stream. The air compressor is driven by a 450 horsepower IC engine.

The plant is located in rural Weld County near Lucerne, Colorado. The area in which the plant operates is designated as attainment for all criteria pollutants. Wyoming is an affected state within 50 miles of the plant. Rocky Mountain National Park and the Rawah Wilderness Area are Federal Class I designated areas within 100 kilometers of the plant.

The Title V application reported the gas plant was not subject to the Accidental Release Prevention Plan provisions of Section 112(r)(7) of the Federal Clean Air Act. EPA has developed a more detailed definition of natural hydrocarbons, and Duke's position is that the new definition makes the gas plant subject to the Prevention Plan requirements.

Construction Permit 96WE905 set the Potential To Emit (PTE) for the entire plant as follows:

Pollutant	Potential to Emit (tpy)	Actuals (tpy)
NOx	222.1	222.1
VOC	110.0	128.1
CO	228.4	228.4
PM	9.3	9.6
PM_{10}	9.3	9.6
HAPs		13.8

The potential emissions are limited by the conditions in Construction Permit 96WE905 to a level that classify this source as synthetic minor with respect to Prevention of Significant Deterioration (PSD) requirements. The estimated actual emissions are from the Division database for calendar year 1996. The actual HAPs are from Construction Permit 96WE905 Condition 7. The actual emissions of the particulate matter as slightly higher than the PTE from the use of slightly different mathematical rounding procedures used in the calculations procedures.

At the time the Title V application was submitted the permittee submitted APENs and construction permit applications for all the sources at the plant. The documents were submitted to update, revise, or correct existing construction permits as necessary, or request a new construction permit. Further, the permittee requested a single permit be issued for the entire plant, rather than for each individual source. The Final Approval for the Construction Permit had not been issued at the time this

operating permit was prepared. The Construction Permit conditions and subsequent revisions requested are being directly incorporated into the issuance of this Operating Permit. The Construction Permit required compliance testing for all the engines and the glycol dehydrator. The testing has not been completed. The due date of the first semi-annual monitoring report required by this operating permit will be more than 180 days after the initial approval construction permit was issued and the equipment commenced operation. In the discussion in the following sections, the Division considers the Responsible Official certification submitted with the first semi-annual report will serve as the self-certification for Construction Permit 96WE905. The Division accepts the responsible official signature of the Title V application as evidence of compliance for all the sources at the plant at the time the Title V application was submitted. The new Construction Permit also required the submittal of a compliance plan for all the sources. The Division accepts the monitoring proposal provided in the Title V application as the submittal of the compliance plan required by the Construction Permit.

After the Title V application had been submitted the permittee requested a modification of the alternative operating scenario. The permittee wanted less restrictions on the requirements whenever an engine was replaced. An extended dialogue between the Division and the permittee developed standard language to be used. At the time the operating permit was prepared the proposal was under review by the State Attorney General's office. The proposed language is incorporated in the operating permit alternative operating scenario section to allow the permittee the operating flexibility desired. Any substantive changes to the proposed language that may be required to address issues raised by the Attorney General's office may require reopening the operating permit to incorporate the changes.

The magnitude and the nature of the discrepancies between the existing construction permits and the information submitted with the Title V application would have precluded the Division from accepting the plant was in compliance at the time the operating permit application was submitted. However, Revised APENs and the construction permit application documents were submitted to correct the discrepancies. The Division accepts that the submittal of the corrected information established a compliance plan that allowed the permittee to certify compliance.

Duke Energy requested the periodic monitoring required by the Operating Permit be performed at four (4) month intervals. The Company has an established three-times-per-year maintenance schedule for maintaining optimal performance of the field equipment. Performance of all the required activities at pre-set internals would allow for efficient use of the field personnel. The Division accepted this request and adjusted the reporting interval from a semi-annual frequency to every four (4) calendar months. This will allow the Company to synchronize the maintenance and the permitting activity requirements.

III. EMISSION SOURCES:

The following sources are specifically regulated under terms and conditions of the Operating Permit for this plant:

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Internal Combustion Engines Powering Compressors
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P001 - Waukesha L-7042 GSI 1100 HP

P002 - Waukesha F-3521 450 HP

P003 - Waukesha L-7042 GSI 1100 HP w/ NSCR

P004 - Waukesha L-7042 GSI 1100 HP w/ NSCR

P005 - Waukesha L-7042 GSI 1100 HP w/ NSCR

P006 - Waukesha F-3521 450 HP w/ NSCR

1. Applicable Requirements: Construction Permit 96WE905 was issued after the Title V permit application was submitted and is being directly incorporated into this operating permit. The Construction Permit set pollutant limits for the total plant, commonly known as 'bubble limits', as well as limits for individual pieces of equipment.

The engines are required to demonstrate compliance by stack tests to be conducted within 180 calendar days of the issuance of the operating permit if they have not already been completed.

Form 2000-604, Item 10, of the Title V application states that emissions of natural gas from compressor engine blowdown during maintenance and during engine start-up qualifies as an insignificant source. The statement continues that emission limits do not apply during the first ½ hour of operation after a cold start. The Division agrees that if calculations to estimate the emissions released are below the APEN threshold when the maintenance blowdown and engine startup are limited to ½ hour, this activity may be considered an insignificant activity. Records will have to be maintained to demonstrate that these activities are performed in less than ½ hour. The permittee could not cite a regulatory basis for the startup statement. The Division does not accept that there is such a provision.

2. Emission Factors: Emissions from reciprocating engines are produced during the combustion process, and are dependent upon the fuel mixture, engine design specifications, and specific properties of the natural gas being burned. The pollutants of concern are Nitrogen Oxides (NOx), Carbon Monoxide (CO) and Volatile Organic Compounds (VOC). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted when combustion is incomplete. Approval of emission factors for use with engines is necessary to the extent that accurate actual emissions are required to verify the need to submit Revised APENs to update the Division emission inventory, and for compliance determination and certification. Construction permit 96WE905 required compliance

testing to be performed on the engines to validate the proposed emission factors. At the time of the preparation of this operating permit the compliance testing had not been completed.

3. Monitoring Plan: The operating permit established a procedure for the calculation of the emissions based on fuel consumption and a fuel based emission factor. The emissions are to be calculated monthly to determine compliance with the hourly limits and the annual (12-month rolling total) limit. A Revised APEN must be submitted to the Division if criteria emissions increase by more than 50 tons per year or 5%, whichever is less, compared to the latest APEN on file with the Division. A copy of a monitoring guidance grid developed by the Division is included at the end of this document. The grid and the Title V application monitoring proposals were used to define the monitoring requirements for the internal combustion engines.

The Division monitoring guidance grid requires more intensive and extensive monitoring of the emissions from internal combustion engines when the total plant emissions approach the threshold for emission increases to be subject to the requirements for Prevention of Significant Deterioration (PSD) review. The increased monitoring is needed to verify that the sources remain not subject to the PSD requirements.

The Division has determined, based on AP-42 emission factors and engineering judgement, that particulate emissions from these type of internal combustion engines will be insignificant if natural gas is exclusively used as the fuel. The use of natural gas will also satisfy the opacity monitoring requirement.

The air/fuel ratio(AFR) controllers are installed to control the fuel mixture to achieve a defined operation or performance level of the engine. The AFRs can be set to optimize the performance of the non-selective catalytic converters (NSCR) installed on the engines. It is the Division's position that the AFRs should be set and operated to ensure the engine emissions remain with the control envelope of the NSCR. A properly functioning NSCR will demonstrate a heat rise across the unit as a result of the oxidation, destruction or conversion of the air pollutants. The media deteriorates with time and needs to be replaced or regenerated. Particulate matter from the engine can be trapped in the catalytic material and lead to an increase in the pressure drop across the control device. The accidental backfire of an engine can result in the loss or destruction of the media. The monitoring plan provides reasonable evidence of the presence and functioning of the catalytic media.

The Division considered the possible relaxation of the engine tri-annual portable monitoring requirements for the 1100 horsepower Waukesha engines (Points P003, P004 & P005) and the Waukesha 450 horsepower engine (P006) to a semi-annual frequency if compliance was demonstrated during all quarters of the first full year of monitoring. The application review found the actual estimated annual emissions are close to the 250 tons per year thresholds for the plant to become a major source for PSD considerations. The Division finds the limited margin justifies the continuation of the more frequent monitoring of the performance of the engines and the air pollution control devices.

4. Compliance Status: The equipment at this site has been operating for an extended time. A current APEN reporting criteria emissions is on file with the Division. Duke certified in the application that natural gas has been used exclusively as the fuel for this unit. As noted previously, the Division accepts the compliance signature of the responsible official as evidence of compliance.

Ethylene Glycol Regeneration Unit w/ Flash Tank

- 1. Applicable Requirements: Construction Permit 96WE905 established the emission and throughput limits for this unit. A future Maximum Available Control Technology (MACT) standard is being developed by the US Environmental Protection Agency for operations at oil and gas facilities. The MACT will most likely contain provisions for certain glycol dehydration units, triggered by the daily gas throughput rate. Until such time as the MACT rule is promulgated, no control requirements exist for this point.
- **2. Emission Factors:** Ethylene glycol is contacted with the natural gas stream to remove moisture. This mixture is heated in the still portion of the unit to drive off the water. Some volatile organic compounds and hazardous air pollutants are also released with the water vapor. Emissions from this process are typically measured with a glycol analysis (rich/lean analysis) or predicted using the Gas Research Institute's computer software model GLYCalc. The model uses input values for the glycol recirculation rate, cubic feet of gas processed, desired moisture content (dew point) for the processed gas, and the amounts of various constituents in the natural gas in an algorithm to estimate VOC and HAP emissions.

The Division accepts the use of the GLYCalc model to estimate emissions in lieu of rich/lean testing. At least once a month the parametric inputs for the GLYCalc model will be recorded. The recording of the input parameters will provide a perspective on the range of the input values over time. The perspective developed will allow consideration of whether more frequent testing is needed for a better estimation of the results. An extended gas analysis will be performed at least once each calendar quarter. Each calendar quarter the GLYCalc model will be used to estimate the emissions based on the parametric inputs and extended gas analysis.

Combustion emissions from the heater are exhausted through a stack separate from the still vent. This heater is rated at 2.25 million Btu/hr and falls under the insignificant activity category of Colorado Regulation No. 3, Part C, Section II.E.3.k. As an insignificant activity the boiler emissions do not need to be addressed directly by this Operating Permit.

3. Monitoring Plan: The monitoring requirements were established from Construction Permit 96WE905, the Division guidance grid included at the end of this document, and the monitoring information provided in the Title V application.

Input parameters from the dehydrator for the GRI GLYCalc model will be recorded at least one day per month. Each four (4) calendar months the newest version of the GRI GLYCalc computer model will be used to estimate the annual emissions of VOC and HAPs. An annual extended wet gas analysis is also required to verify or adjust the computer model inputs as necessary. The record of the values of the model input parameters allows the variability in the parameters to be followed.

A Revised APEN is required if a significant increase of VOC or HAPs occur as defined in Colorado Regulation No. 3, Part A, Section II.C.2. compared to the APEN currently on file with the Division.

4. Compliance Status: The equipment at this site has been operating for an extended time. A current APEN reporting criteria emissions is on file with the Division. Duke certified in the application that natural gas has been used exclusively as the fuel for this unit. As noted previously, the Division accepts the compliance signature of the responsible official as evidence of compliance.

Fugitive Emissions of Volatile Organic Compounds from Equipment Leaks

- **1. Applicable Requirements:** The Division has made the determination that fugitive VOC emissions from equipment leaks at gas compression or processing facilities must be calculated and evaluated for the appropriate permitting requirements. The Title V application stated, and the Division accepts, that the plant is not subject to the provisions of 40 CFR Part 60, Subpart KKK
- **2. Emission Factors:** The fugitive leak emissions are calculated based on emission factors from EPA's Protocol for Emission Leak Estimates. These factors have changed several times in the recent past. The factors used were current at the time the construction permit was prepared. The EPA factors estimate the total organic compounds. The factors are multiplied by the number of components of each type (e.g. compressor seals, flanges, etc) and the VOC weight percentage in the gas stream as determined in the most recent gas analysis.
- **3. Monitoring Plan:** The permittee must perform an initial count of the components within 90 days of the issuance of the Operating Permit. The permittee is then required to maintain a running tally of the component count in order to perform the fugitive leak emissions estimate. Plumbing modifications at a facility are an on-going process. Sufficient time has lapsed since the Construction Permit component count was performed for modifications to have changed the component count. The count must be re-established in order to provide the correct base for the running tally. An actual physical count of the number of process valves, relief valves, pump seals, compressor seals and flanges/connections is to be performed once every five years to verify the tally has been correctly and currently maintained. A 50% or 5 ton per year increase in criteria pollutant emissions, whichever is less, will necessitate the need for submittal of a Revised APEN.

4. Compliance Status: The equipment at this site has been operating for an extended time. A current APEN reporting criteria emissions is on file with the Division. Duke Power certified in the application that natural gas has been used exclusively as the fuel for this unit. As noted above, the Division accepts the compliance signature of the responsible official as evidence of compliance.

Condensate Tank Truck Loadout

- 1. Applicable Requirements: During the review of the draft of the operating permit the permittee reported the condensate tanks were exempt from the applicable requirements of 40 CFR Part 60 Subpart Kb Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced after July 23, 1984. The storage tanks are for storing condensate prior to off-site transfer by truck. Upon review the Division accepted the exemption. The applicable requirements of Construction Permit 96WE905 are adjusted directly in this Operating Permit. The VOC emissions were reduced to remove the storage tank estimated working/breathing losses originally included in the Construction Permit limits.
- **2. Emission Factors:** The truck loadout emissions are estimated from the equation provided in AP-42, and adjusted for the NonMethane, NonEthane VOC content of the liquid loaded. This equation is also included in the permit to establish the various factors to be used in the calculation.
- **3. Monitoring Plan:** The emissions from the truck loadout will be based on the recordkeeping of the gallons of throughput for the tanks.

A Revised APEN is required if a significant increase of VOC or HAPs occur as defined in Colorado Regulation No. 3, Part A, Section II.C.2. compared to the APEN currently on file with the Division.

4. Compliance Status: The equipment at this site has been operating for an extended time. A current APEN reporting criteria emissions is on file with the Division. As noted earlier, the Division accepts the compliance signature of the responsible official as evidence of compliance.

Natural Gas Liquids Truck Loadout Rack

1. Applicable Requirements: As noted in the previous section the change in the emissions for the condensate tank loadout and the natural gas liquid loadout was changed directly in the Title V permit.

- **2. Emission Factors:** The truck loadout emissions are generated from the natural gas liquids remaining in the transfer hoses when the hoses are disconnected after loading the trucks, and any leak at the joints. The emissions are estimated from a calculation of the amount of trapped gas retained in the hoses. The estimated emissions are adjusted for the NonMethane, NonEthane VOC content of the liquid loaded.
- **3. Monitoring Plan:** The emissions from the truck loadout will be based on the record keeping of the gallons of throughput for the tanks.

A Revised APEN is required if a significant increase of VOC or HAPs occur as defined in Colorado Regulation No. 3, Part A, Section II.C.2. compared to the APEN currently on file with the Division.

4. Compliance Status: The equipment at this site has been operating for an extended time. A current APEN reporting criteria emissions is on file with the Division. As noted earlier, the Division accepts the compliance signature of the responsible official as evidence of compliance.

Insignificant Activities

The permittee needs to periodically review the insignificant activities to determine if they are still insignificant and in compliance with all applicable requirements. A record of review, the compliance determination, and any additions, deletions or changes to the insignificant source inventory should be maintained. The record will support the annual compliance certification for the insignificant sources. The inventory of insignificant sources provided in the permit application is included in Appendix A of the operating permit as a starting reference.

The Division's has some previous experience with purging/venting procedures during the startup and shutdown of compressor engines similar in size to the ones in this permit. The Division has generally found the engine dimensions and the presumption of a 20% VOC content in the gas stream results in the VOC emissions being less than two (2) tons per year. Since this estimated value is below the APEN reporting threshold established in Colorado Regulation 3 the Division concludes that these emissions are insignificant. The permittee might consider keeping records to demonstrate the maintenance and startup blowdown procedures do not require more than 30 minutes.

The Title V application noted that the three (3) condensate storage tanks needed construction permits because they were subject to the provisions of the New Source Performance Standards (NSPS), Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels (including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commence after July 23, 1984. The tanks were subject to the provisions because of the liquid stored, the tanks sizes, and the installation date. Subsequent to the application submittal, Duke

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Energy determined the tanks were not subject to the Kb provision, thus APEN exempt and should be considered to be insignificant sources.

The exemptions from Subpart Kb includes §60.110b(d)(4) which allows exemption from Kb under the following definition "Vessels with a design capacity less than or equal to 1,589.874 m³ used for petroleum or condensate stored, processed, or treated prior to custody transfer." Further, NSPS Subpart Ka §60.111b(c) states "Custody transfer means the transfer of produced petroleum and/or condensate, after processing and/or treatment in the producing operations, from storage vessels or automatic transfer facilities to pipelines or any other forms of transportation."

Duke's position is that the condensate is produced on-site by separation (processing) from the pipeline gas. The condensate collected is stored in the tanks prior to the custody transfer to the trucking company moving the condensate off-site. Therefore, the tanks store the condensate prior to custody transfer. The Division accepts the Duke position. The Title V permit includes the condensate tanks as insignificant sources.

Alternative Operating Scenario

Alternative Operating Scenario language is provided in the permit to allow for "like-kind" replacement of the internal combustion engines without the need to modify the permit. The provision of a different kind of engine requires the permit to be re-opened to properly incorporate the new equipment.

Hazardous Air Pollutants

The applicable requirement is for the reporting of estimated emissions above the appropriate bin thresholds established in Appendix D of Regulation No. 3. Hazardous air pollutant emissions for each source are estimated from manufacturer's information, AP-42 and GRI technical reports. Whenever there is an increase in the level of emissions of hazardous air pollutants, a Revised APEN must be submitted. The Division accepts this source was in compliance at the time the Title V application was submitted.

Permit Shield

The intent of the permit shield is to provide limited protection to the plant in the event of an error in the evaluation of whether a regulation, or portion of a regulation applies. The plant identifies the issue and presents its position. The Division reviews the position. If the Division and the plant mutually agree on the position, the issue is recorded in the permit. If, at a later date, it is determined that an error was made in the mutual decision, the plant is protected from enforcement action until the permit can be reopened and the correct requirements and a compliance schedule inserted.

In this application, an extensive list of non-applicable sections of the Federal and State regulations are identified for the sources, and the request for the shield justified.

Miscellaneous

From time to time published emission factors are changed based on new or improved data. A logical concern is what happens if the use of the new emission factor in a calculation results in a source being out of compliance with a permit limit. For this operating permit, the emission factors or emission factor equations included in the permit are considered to be fixed until changed by the permit. Obviously, factors dependent on the fuel sulfur content or heat content can not be fixed and will vary with the test results. The formula for determining the emission factors is, however, fixed. It is the responsibility of the permittee to be aware of changes in the factors, and to notify the Division in writing of impacts on the permit requirements when there is a change in factors. Upon notification, the Division will work with the permittee to address the situation.